

FCC PART 15.247



TEST REPORT

For

Shenzhen Guo Wei Electronics Co. Ltd.

No. 3038, Luosha Road, Liantang, Luohu District, Shenzhen, Guangdong, China

FCC ID: 2AA3EPOWERMAT

Report Type: Original Report	Product Type: DECT Cordless Telephone (Base Unit)
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Report Number:	RSZ130910003-00BT
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Guo Wei Electronics Co. Ltd.*'s product, model number: *Powermat (FCC ID: 2AA3EPOWERMAT)* or the "EUT" in this report was a base unit of *DECT Cordless Telephone*, which was measured approximately: 22.6 cm (L) x 7.7 cm (W) x 3.3 cm (H), rated input voltage: DC 10V from adapter.

Adapter Information: AC Power Adapter
Model: MN-A012-L170;
Input: 100-240V~50/60Hz 0.3A max;
Output: DC 10V, 1.2A

** All measurement and test data in this report was gathered from production sample serial number: 1309018 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-09-10.*

Objective

This report is prepared on behalf of *Shenzhen Guo Wei Electronics Co. Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15D PUB and Part 15C DCD base unit submission with FCC ID: 2AA3EPOWERMAT.
FCC Part 15D PUE handset unit submission with FCC ID: 2AA3EPOWERMAT.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing with the test software.

EUT Exercise Software

Software: CSR BlueTest 3

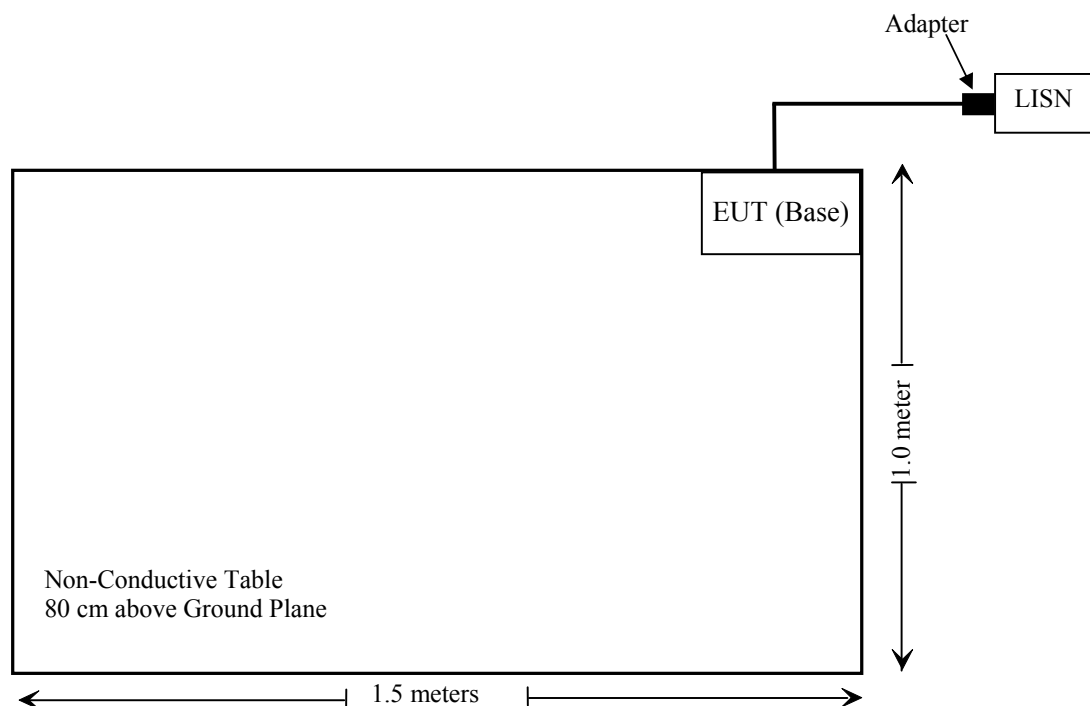
Equipment Modifications

No modification was made to the EUT tested.

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Undetectable DC Power Cable	1.5	EUT	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 15.319 (i)&2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

§1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**Applicable Standard**

According to FCC §15.319(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	842/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Calculation

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Channel	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
High	2480	0	1	1.16	1.306	20	0.00026	1.0

Result: The device meets MPE limit at 20 cm distance.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has a PCB antenna connect to bluetooth module, which in accordance to section 15.203, the maximum gain is 0 dBi. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

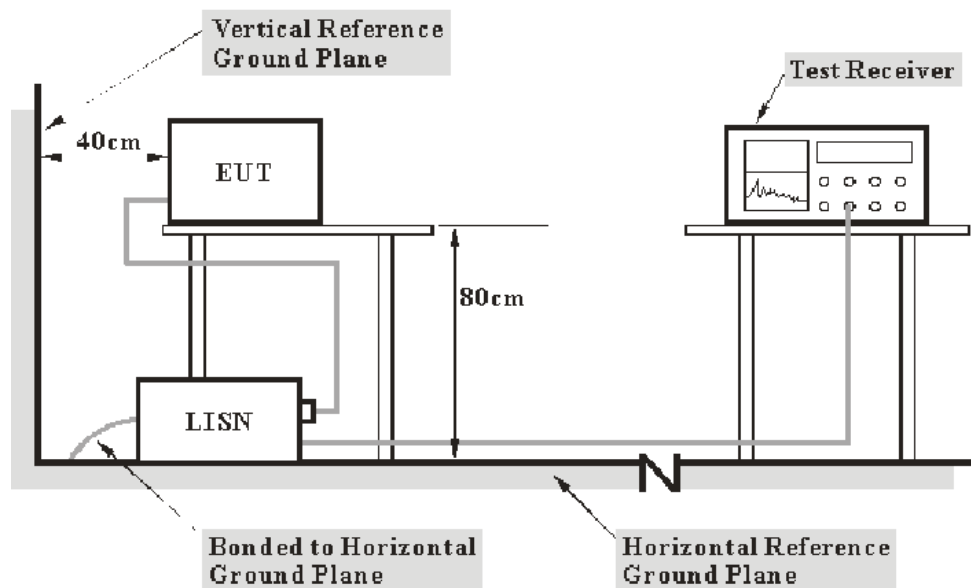
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2013-06-17	2014-06-17
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2013-05-07	2014-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-08-09	2014-08-09
Rohde & Schwarz	CE Test software	EMC 32	V8.53	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

14.5 dB at 0.326000 MHz in the **Line** conducted mode

Test Data

Environmental Conditions

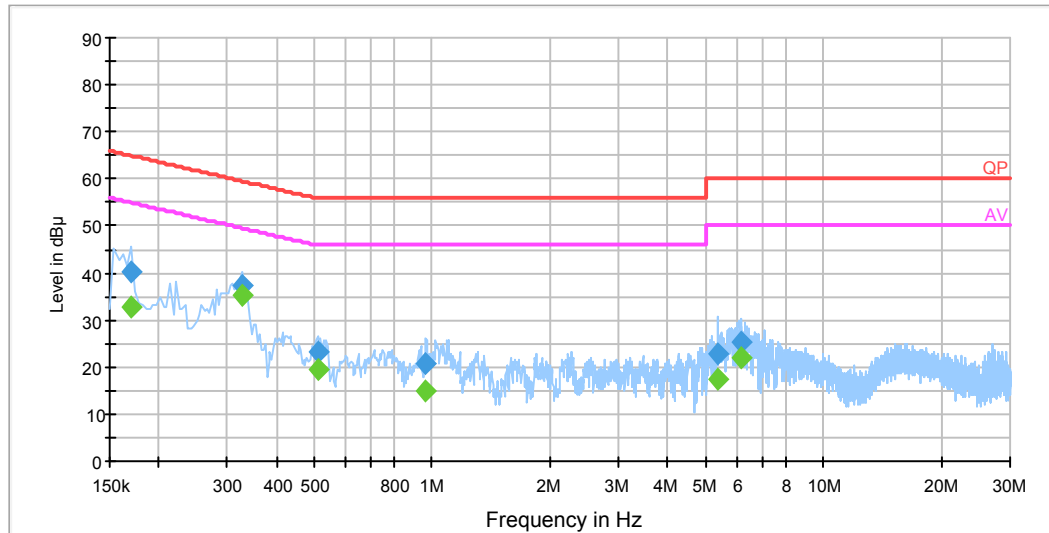
Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

The testing was performed by Gardon Zhang on 2013-09-30.

Test Mode: Transmitting

AC 120 V, 60 Hz, Line:

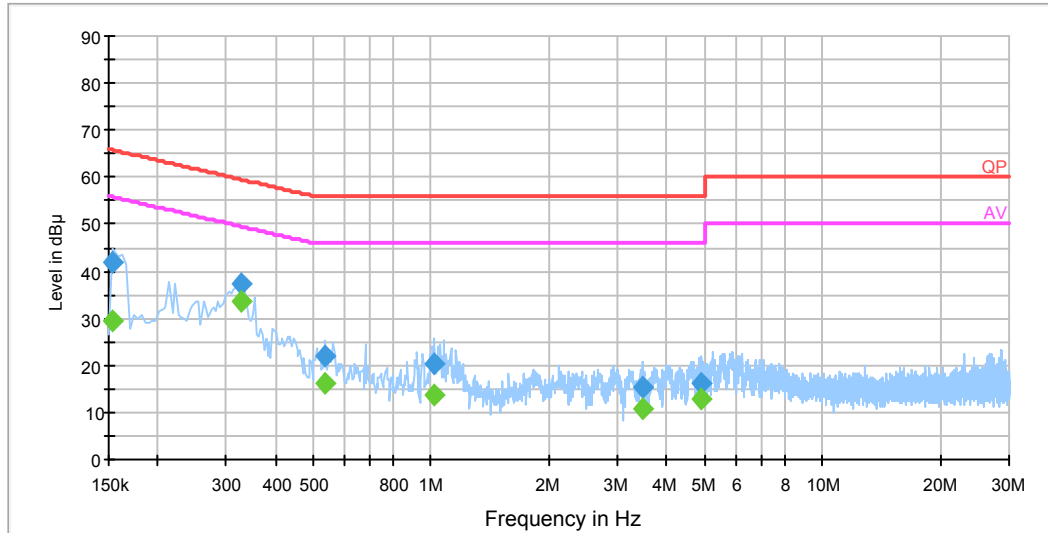
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave.)
0.170000	40.0	19.5	65.0	25.0	QP
0.170000	33.0	19.5	55.0	22.0	Ave.
0.326000	37.4	19.5	59.6	22.2	QP
0.326000	35.1	19.5	49.6	14.5	Ave.
0.510000	23.1	19.5	56.0	32.9	QP
0.510000	19.6	19.5	46.0	26.4	Ave.
0.966000	20.5	19.5	56.0	35.5	QP
0.966000	15.0	19.5	46.0	31.0	Ave.
5.382000	22.8	19.6	60.0	37.2	QP
5.382000	17.4	19.6	50.0	32.6	Ave.
6.146000	25.3	19.7	60.0	34.7	QP
6.146000	21.9	19.7	50.0	28.1	Ave.

AC 120V, 60 Hz, Neutral:

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave.)
0.154000	42.0	19.5	65.8	23.8	QP
0.154000	29.4	19.5	55.8	26.4	Ave.
0.326000	37.1	19.5	59.6	22.5	QP
0.326000	33.6	19.5	49.6	16.0	Ave.
0.538000	22.0	19.5	56.0	34.0	QP
0.538000	16.2	19.5	46.0	29.8	Ave.
1.018000	20.4	19.5	56.0	35.6	QP
1.018000	13.8	19.5	46.0	32.2	Ave.
3.462000	15.1	19.6	56.0	40.9	QP
3.462000	10.7	19.6	46.0	35.3	Ave.
4.926000	16.1	19.7	56.0	39.9	QP
4.926000	13.0	19.7	46.0	33.0	Ave.

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

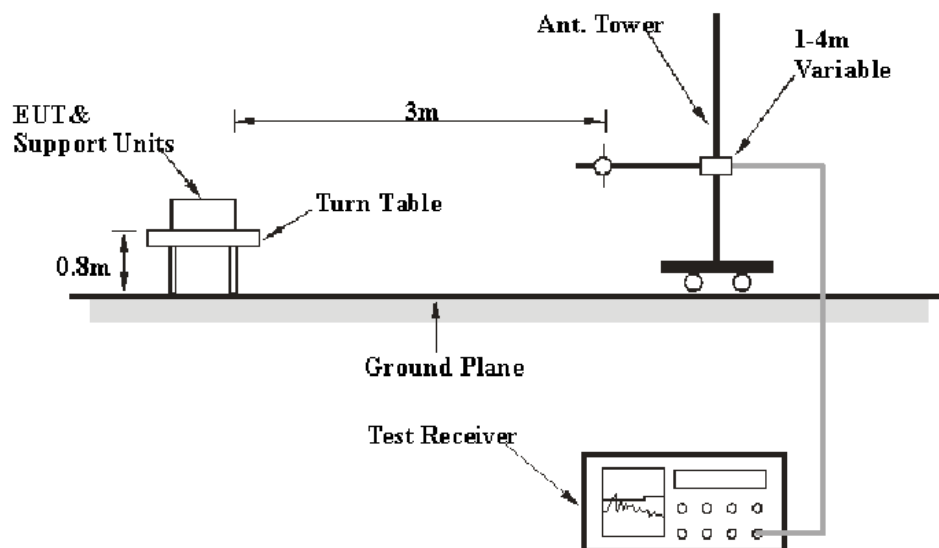
FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) will not be taken into consideration for the test data recorded in the report

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz to 1GHz and peak and Average detection modes for frequencies above 1GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-17	2014-09-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
SUPER ULTRA	Amplifier	ZVA-183-S+	5969001149	2013-04-03	2014-04-03
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, with the worst margin reading of:

5.91 dB at 4960.0 MHz in the Horizontal polarization

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Gardon Zhang on 2013-10-15.

30 MHz ~ 25 GHz*Test mode: Transmitting (BDR Mode (GFSK))*

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.209/15.205	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
248.6	45.25	QP	85	1.2	H	-15.8	29.45	46	16.55
2402.0	82.79	PK	312	1.5	H	6.13	88.92	/	/
2402.0	72.76	Ave.	312	1.5	H	6.13	78.89	/	/
2402.0	86.16	PK	128	1.4	V	6.13	92.29	/	/
2402.0	74.58	Ave.	128	1.4	V	6.13	80.71	/	/
2342.9	36.57	PK	349	1.2	V	5.48	42.05	74	31.95
2342.9	23.41	Ave.	349	1.2	V	5.48	28.89	54	25.11
2388.5	38.64	PK	123	1.3	V	6.13	44.77	74	29.23
2388.5	24.06	Ave.	123	1.3	V	6.13	30.19	54	23.81
2486.5	37.50	PK	210	1.3	H	7.21	44.71	74	29.29
2486.5	22.48	Ave.	210	1.3	H	7.21	29.69	54	24.31
4804.0	41.50	PK	267	1.4	H	12.40	53.90	74	20.10
4804.0	29.39	Ave.	267	1.4	H	12.40	41.79	54	12.21
7206.0	33.57	PK	356	1.3	V	17.06	50.63	74	23.37
7206.0	22.04	Ave.	356	1.3	V	17.06	39.10	54	14.90
9608.0	32.46	PK	208	1.4	V	19.28	51.74	74	22.26
9608.0	21.24	Ave.	208	1.4	V	19.28	40.52	54	13.48
Middle Channel (2441 MHz)									
248.6	45.82	QP	214	1.2	H	-15.8	30.02	46	15.98
2441.0	82.47	PK	78	1.3	H	7.21	89.68	/	/
2441.0	72.31	Ave.	78	1.3	H	7.21	79.52	/	/
2441.0	83.26	PK	158	1.4	V	7.21	90.47	/	/
2441.0	73.01	Ave.	158	1.4	V	7.21	80.22	/	/
2385.8	36.57	PK	351	1.5	V	6.13	42.70	74	31.30
2385.8	23.49	Ave.	351	1.5	V	6.13	29.62	54	24.38
2486.0	39.24	PK	114	1.3	H	7.21	46.45	74	27.55
2486.0	25.10	Ave.	114	1.3	H	7.21	32.31	54	21.69
2492.2	38.47	PK	334	1.2	H	7.21	45.68	74	28.32
2492.2	23.67	Ave.	334	1.2	H	7.21	30.88	54	23.12
4882.0	43.43	PK	163	1.2	V	12.46	55.89	74	18.11
4882.0	32.32	Ave.	163	1.2	V	12.46	44.78	54	9.22
7323.0	33.27	PK	131	1.3	H	16.49	49.76	74	24.24
7323.0	22.13	Ave.	131	1.3	H	16.49	38.62	54	15.38
9764.0	32.75	PK	211	1.5	H	19.40	52.15	74	21.85
9764.0	21.07	Ave.	211	1.5	H	19.40	40.47	54	13.53

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.209/15.205	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
248.6	45.65	QP	130	1.4	H	-15.8	29.85	46	16.15
2480.0	81.61	PK	205	1.6	H	7.21	88.82	/	/
2480.0	71.66	Ave.	205	1.6	H	7.21	78.87	/	/
2480.0	84.44	PK	63	1.2	V	7.21	91.65	/	/
2480.0	74.02	Ave.	63	1.2	V	7.21	81.23	/	/
2378.6	36.49	PK	317	1.2	H	6.13	42.62	74	31.38
2378.6	23.48	Ave.	317	1.2	H	6.13	29.61	54	24.39
2485.3	38.65	PK	185	1.3	V	7.21	45.86	74	28.14
2485.3	25.11	Ave.	185	1.3	V	7.21	32.32	54	21.68
2490.1	37.59	PK	321	1.4	V	7.21	44.80	74	29.20
2490.1	24.68	Ave.	321	1.4	V	7.21	31.89	54	22.11
4960.0	46.30	PK	293	1.3	H	12.50	58.80	74	15.20
4960.0	35.59	Ave.	293	1.3	H	12.50	48.09	54	5.91
7440.0	34.27	PK	242	1.3	H	15.90	50.17	74	23.83
7440.0	22.57	Ave.	242	1.3	H	15.90	38.47	54	15.53
9920.0	33.06	PK	272	1.5	V	19.38	52.44	74	21.56
9920.0	22.03	Ave.	272	1.5	V	19.38	41.41	54	12.59

FCC §15.247(a) (1)-CHANNEL SEPARATION TEST**Applicable Standard**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Set the EUT in Operating mode, radio spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

* The testing was performed by Gardon Zhang on 2013-09-30.

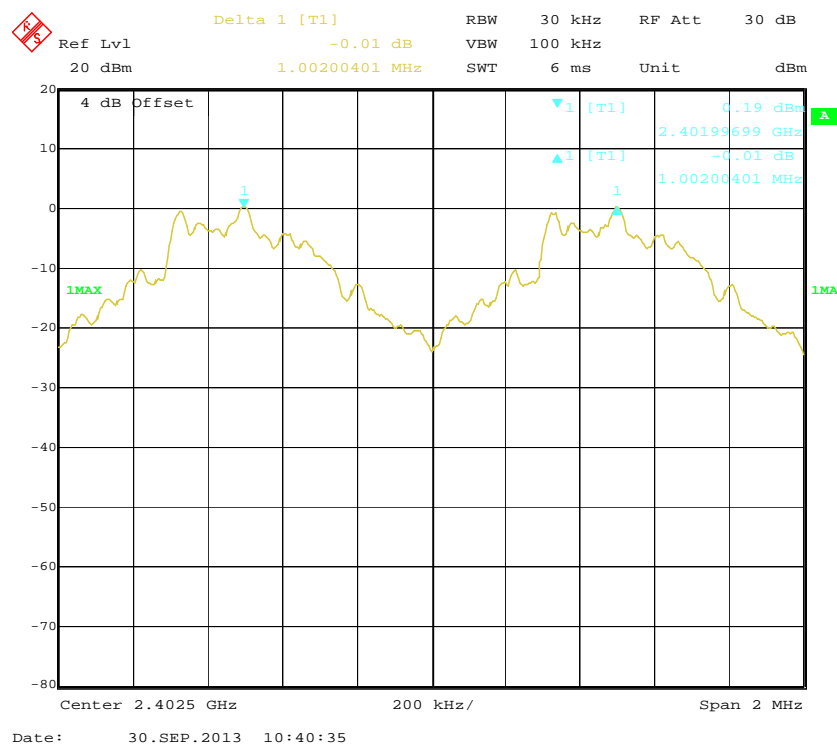
Test Result: Compliance.

Please refer to following tables and plots

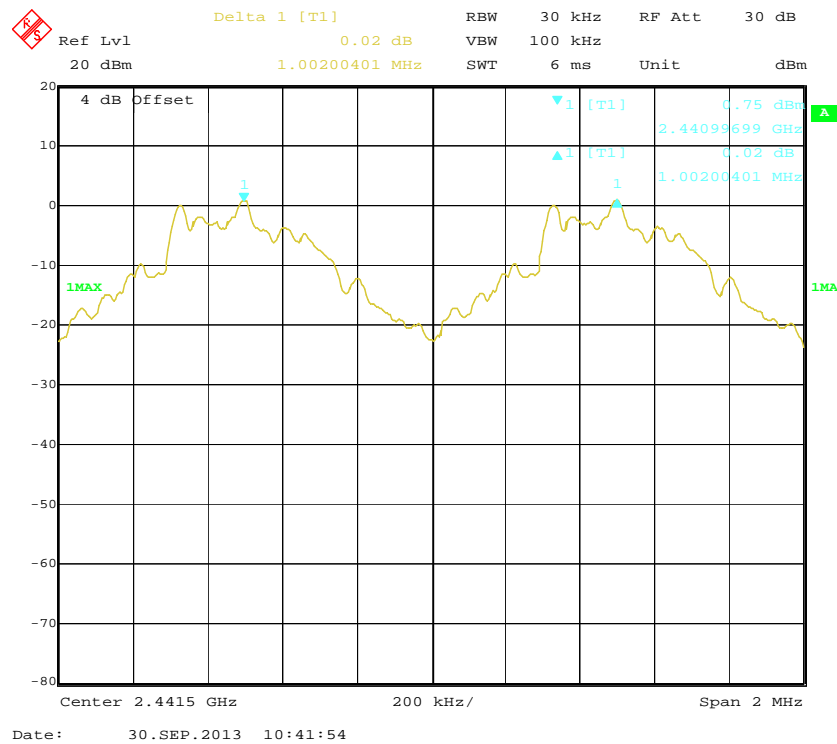
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.002	0.596	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.596	Pass
	Adjacent	2442			
	High	2480	1.002	0.596	Pass
	Adjacent	2479			

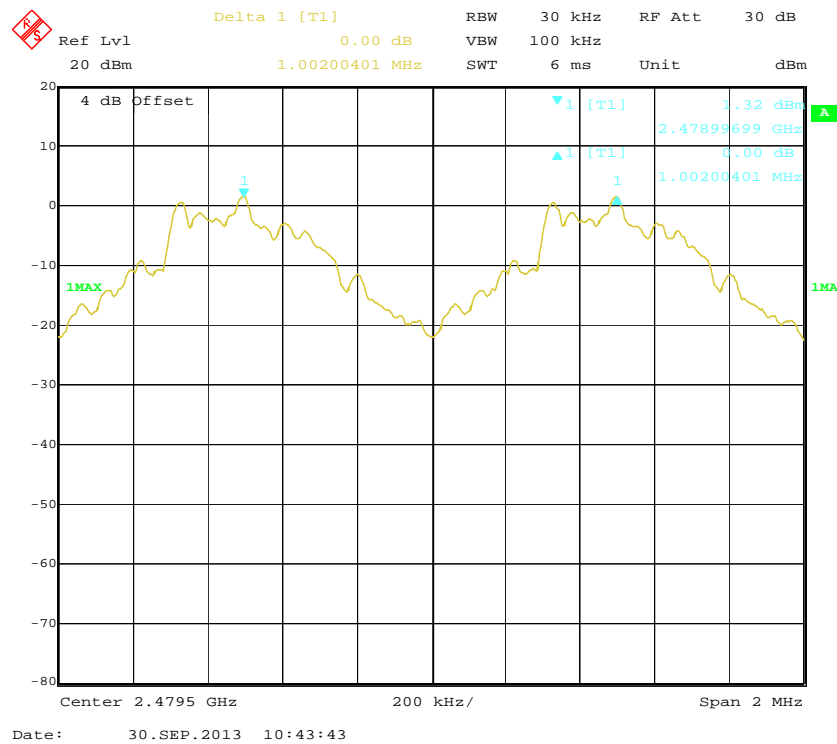
Note: Limit = 20 dB bandwidth *2/3

BDR (GFSK): Low Channel

BDR (GFSK): Middle Channel



BDR (GFSK): High Channel



FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING**Applicable Standard**

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

* The testing was performed by Gardon Zhang on 2013-09-30.

Test Result: Compliance.

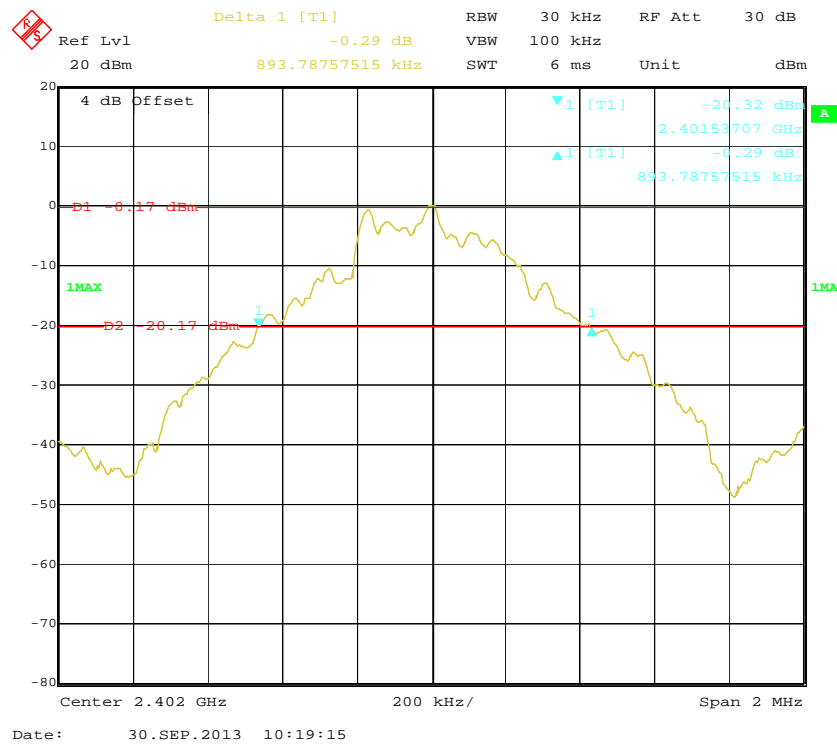
Please refer to following tables and plots

Test Mode: Transmitting

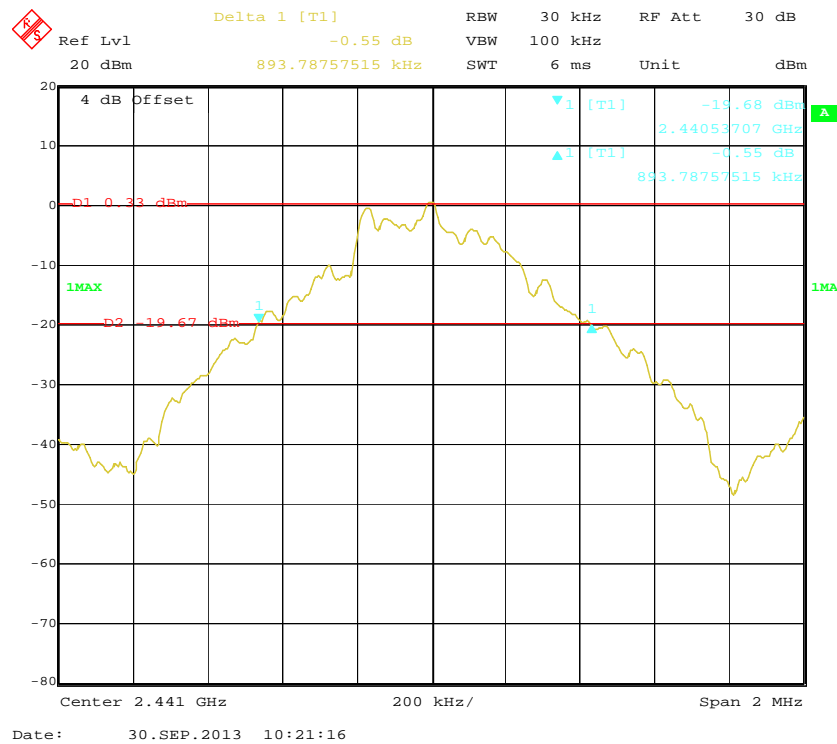
Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.894
	Middle	2441	0.894
	High	2480	0.894

Please refer to the following plots.

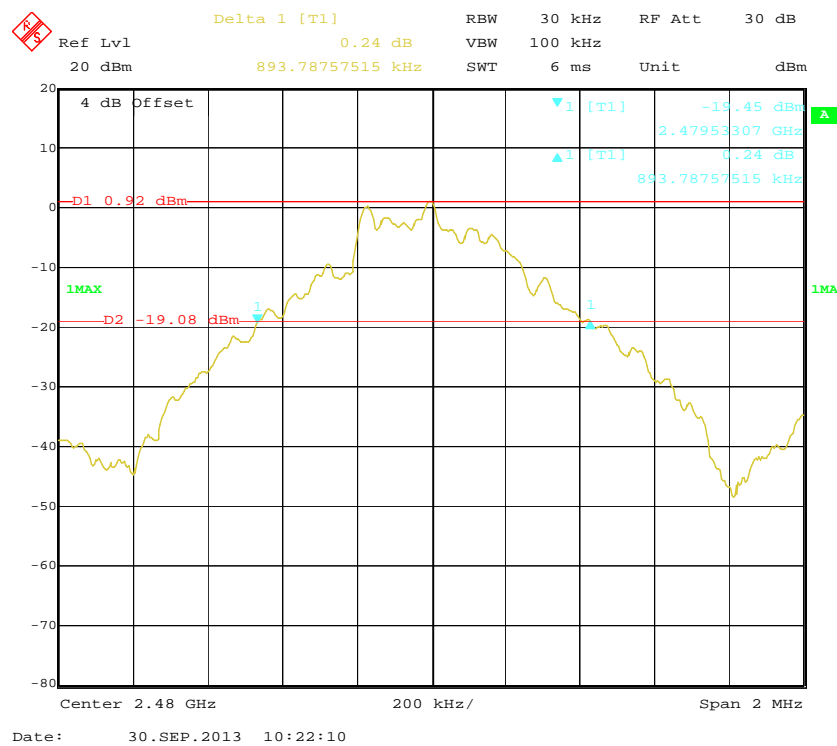
BDR (GFSK): Low Channel



BDR (GFSK): Middle Channel



BDR (GFSK): High Channel



FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST**Applicable Standard**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the max-hold function record the quantity of the channel.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

**The testing was performed by Gardon Zhang on 2013-09-30.*

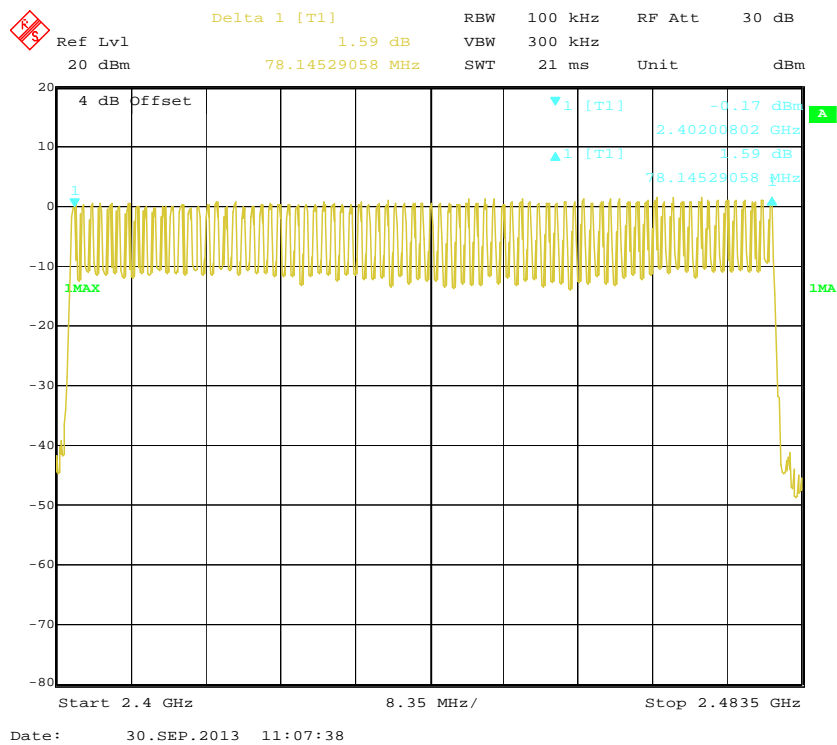
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels



FCC §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWEELL TIME)**Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

* The testing was performed by Gardon Zhang on 2013-09-30.

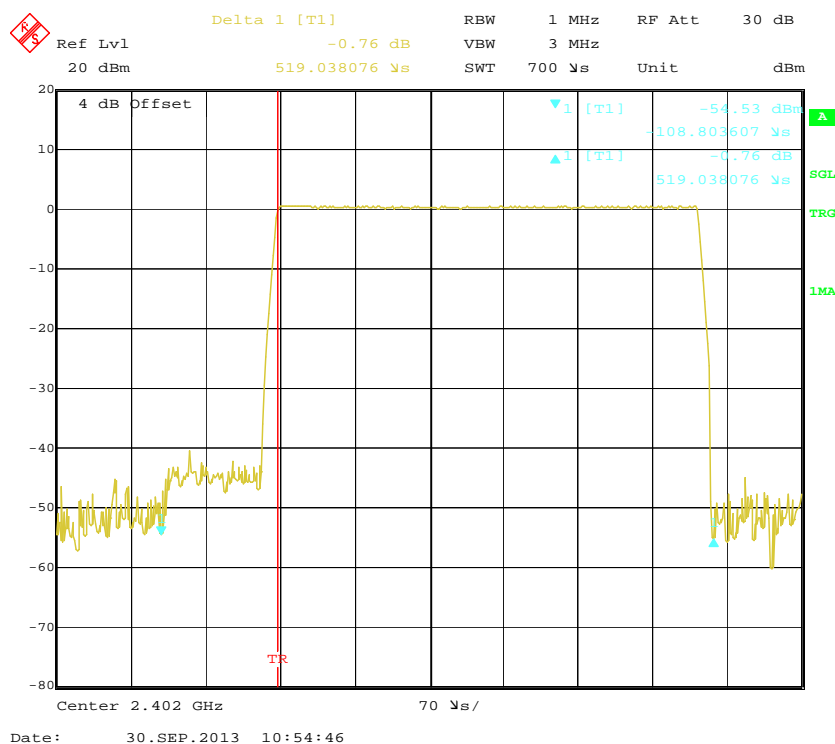
Test Result: Compliance.

Please refer to following tables and plots

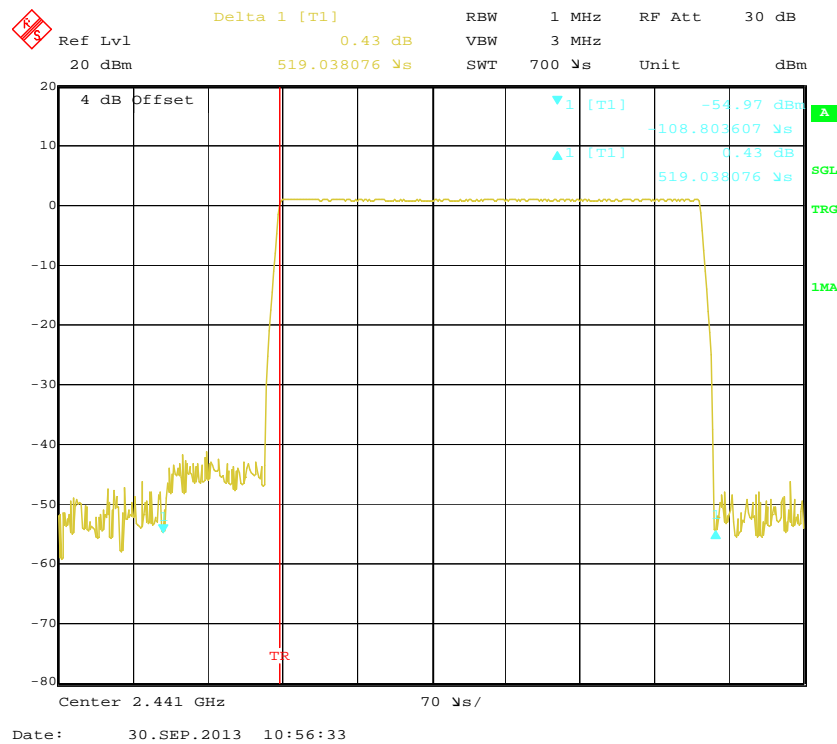
Test Mode: Transmitting

Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.5190	0.1661	0.4	Pass
		Middle	0.5190	0.1661	0.4	Pass
		High	0.5190	0.1661	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.7872	0.2860	0.4	Pass
		Middle	1.7872	0.2860	0.4	Pass
		High	1.7872	0.2860	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.0407	0.3243	0.4	Pass
		Middle	3.0407	0.3243	0.4	Pass
		High	3.0407	0.3243	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

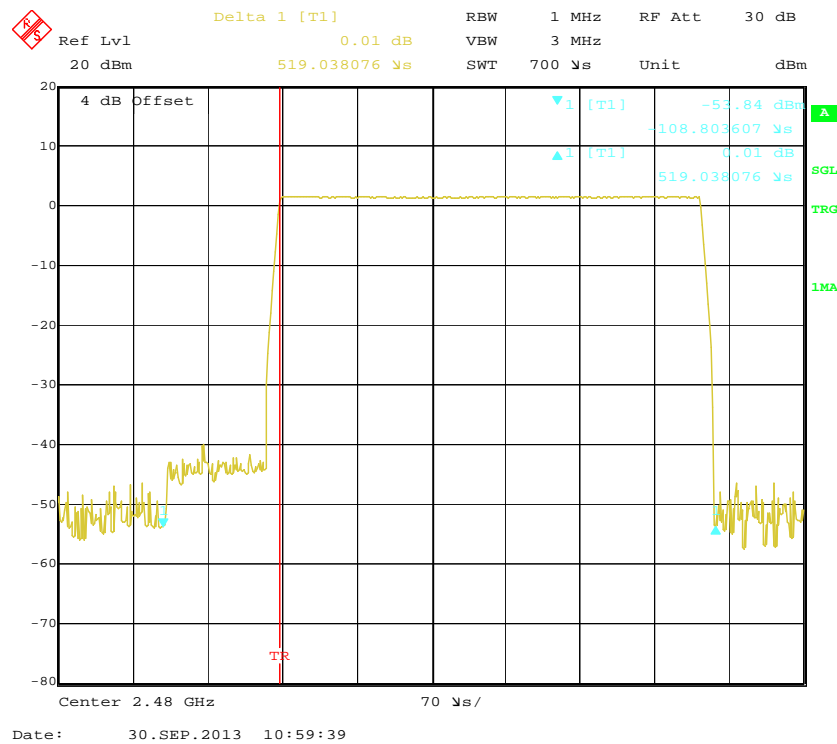
Pulse time, Low Channel, DH1



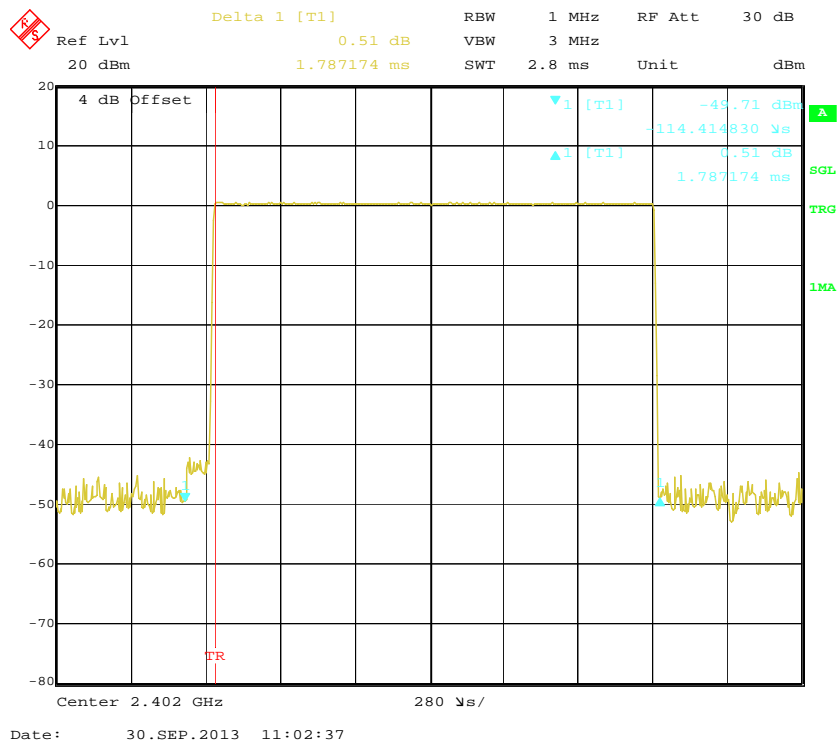
Pulse time, Middle Channel, DH1



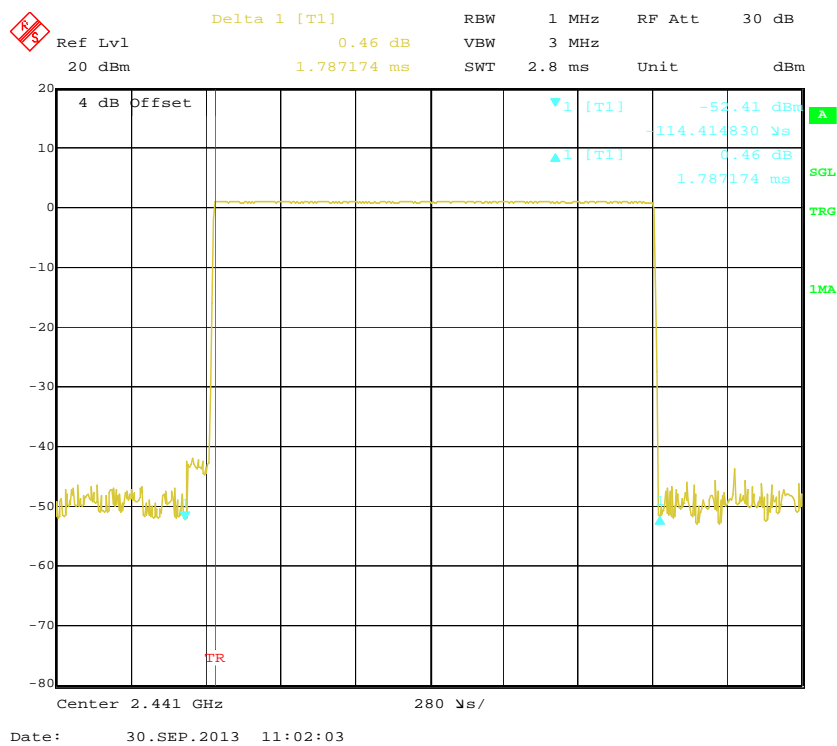
Pulse time, High Channel, DH1



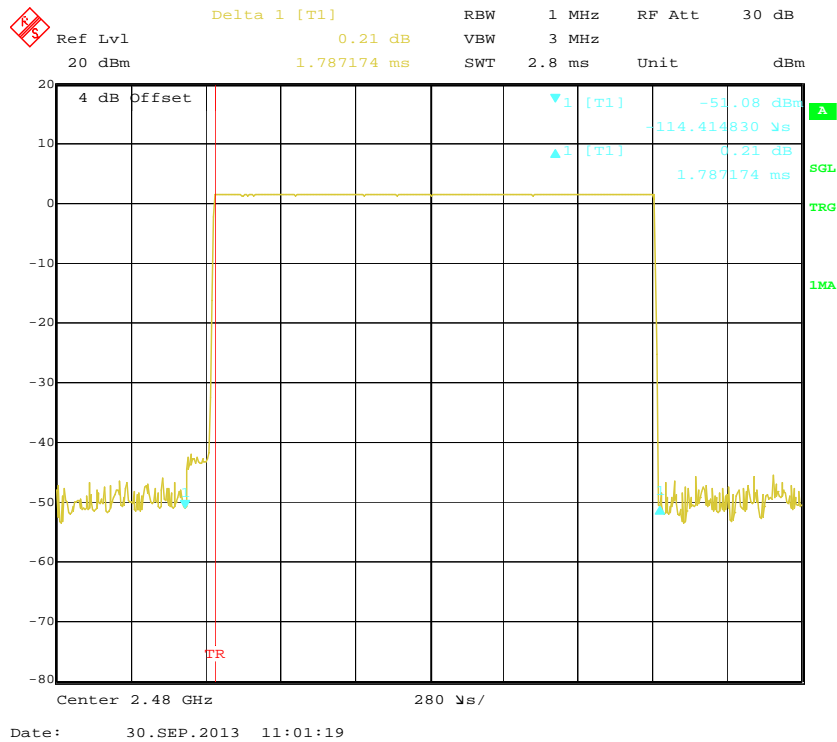
Pulse time, Low Channel, DH3



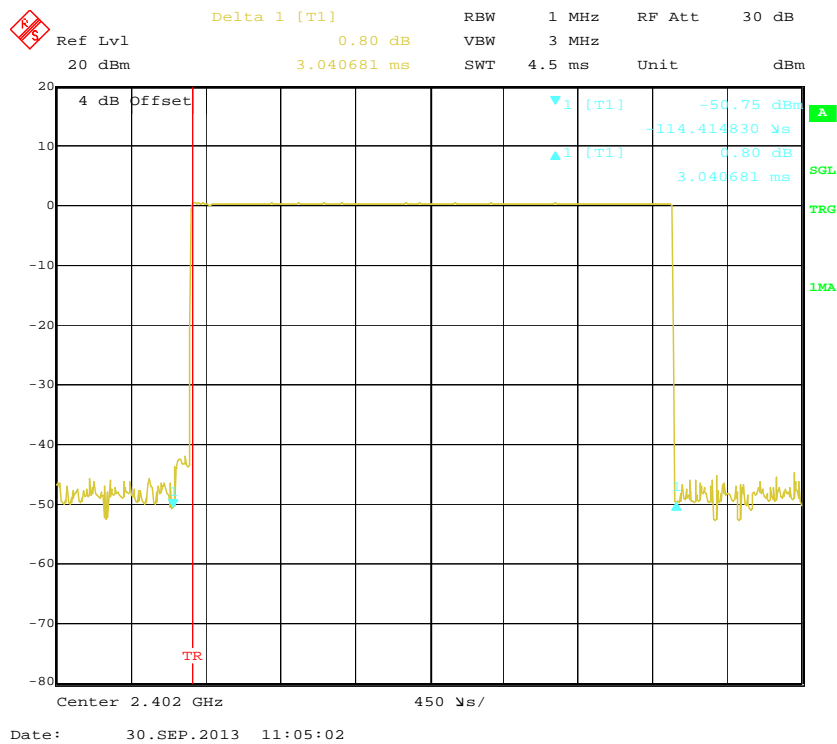
Pulse time, Middle Channel, DH3



Pulse time, High Channel, DH3



Pulse time, Low Channel, DH5



Ref Lvl: 20 dBm
Delta 1 [T1]: 0.88 dB
RBW: 1 MHz
VBW: 3 MHz
SWT: 4.5 ms
Unit: dBm

Center: 2.441 GHz
Scale: 450 V/s

Peak Data:

Frequency (GHz)	Power (dBm)	Width (ms)
-45.10	-45.10 dBm	-
-114.414830	-114.414830 dBm	-
0.88	0.88 dB	3.040681 ms

Other Labels: TR, SGL, TRG, 1MA, A

Ref Lvl 20 dBm Delta 1 [T1] 0.63 dB RBW 1 MHz RF Att 30 dB

20 dBm 3.040681 ms SWT 4.5 ms Unit dBm

4 dB Offset

Center 2.48 GHz 450 MHz

-80 -70 -60 -50 -40 -30 -20 -10 0 10 20

-45.93 dBm -114.414830 V

0.63 dB 3.040681 ms

TR

30.SEP.2013 11:05:34

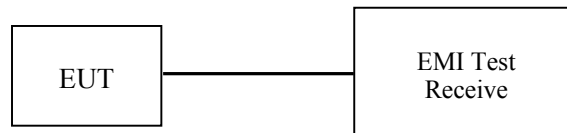
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
3. Add a correction factor to the display.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

* The testing was performed by Gardon Zhang on 2013-09-30.

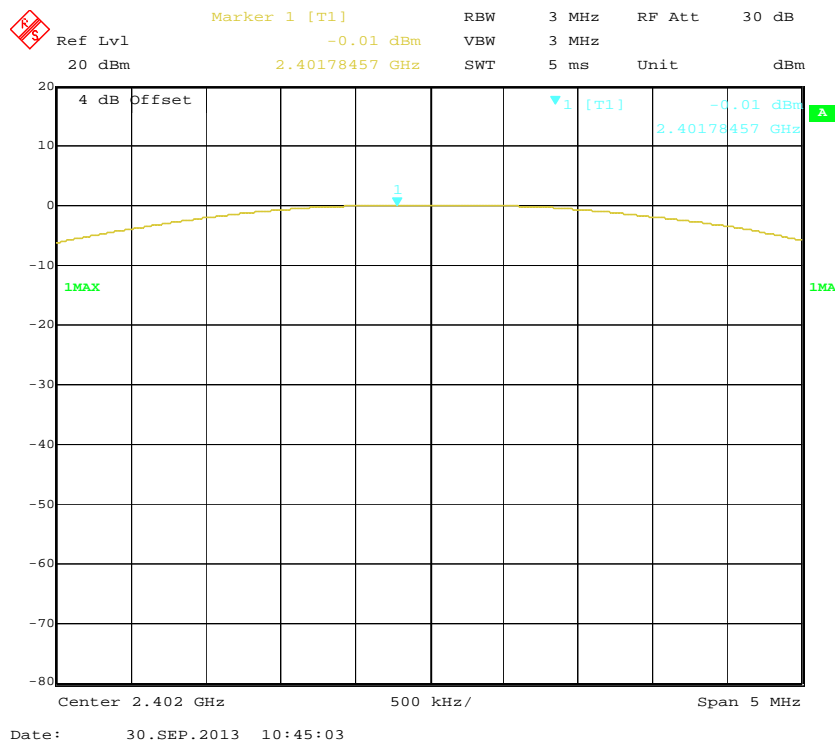
Test Result: Compliance.

Test Mode: Transmitting

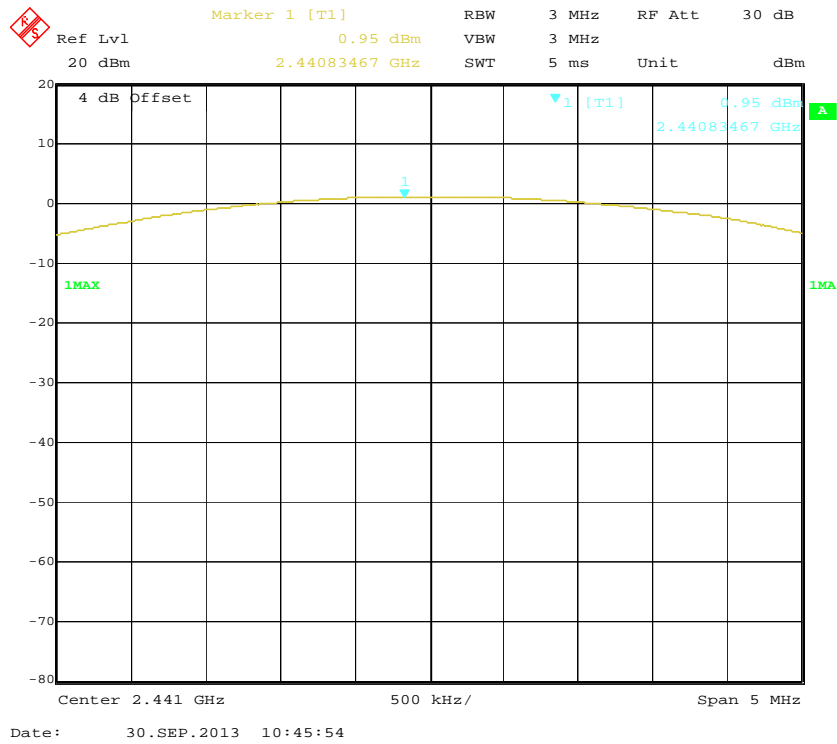
Mode	Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	-0.01	0.998	1000
	Middle	2441	0.95	1.245	1000
	High	2480	1.16	1.306	1000

Note: The data above was tested in conducted mode.

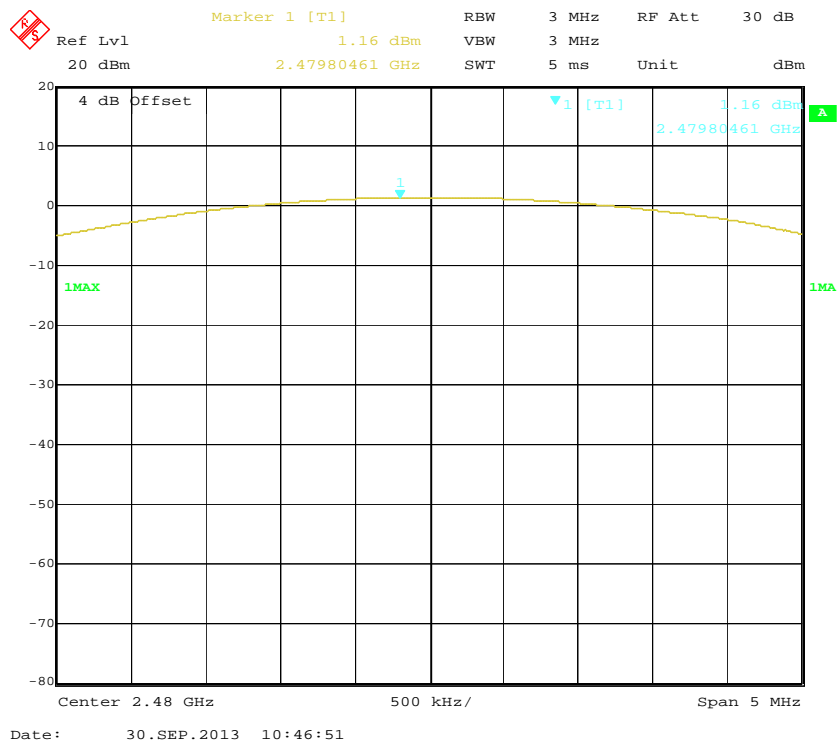
BDR (GFSK): Low Channel



BDR (GFSK): Middle Channel



BDR (GFSK): High Channel



FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in Operating mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	100.2 kPa

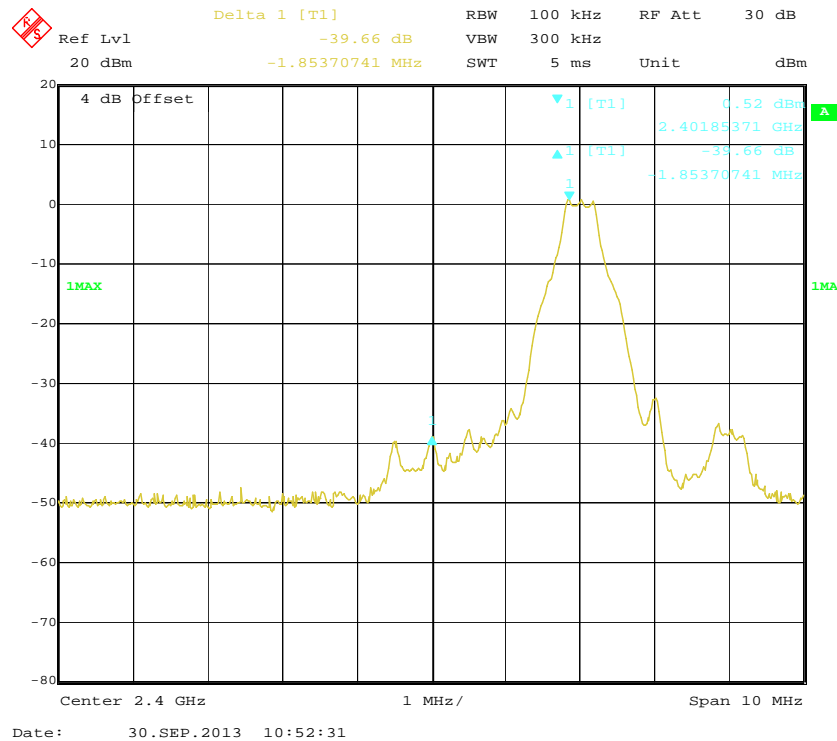
*The testing was performed by Gardon Zhang on 2013-09-30.

Test Result: Compliance.

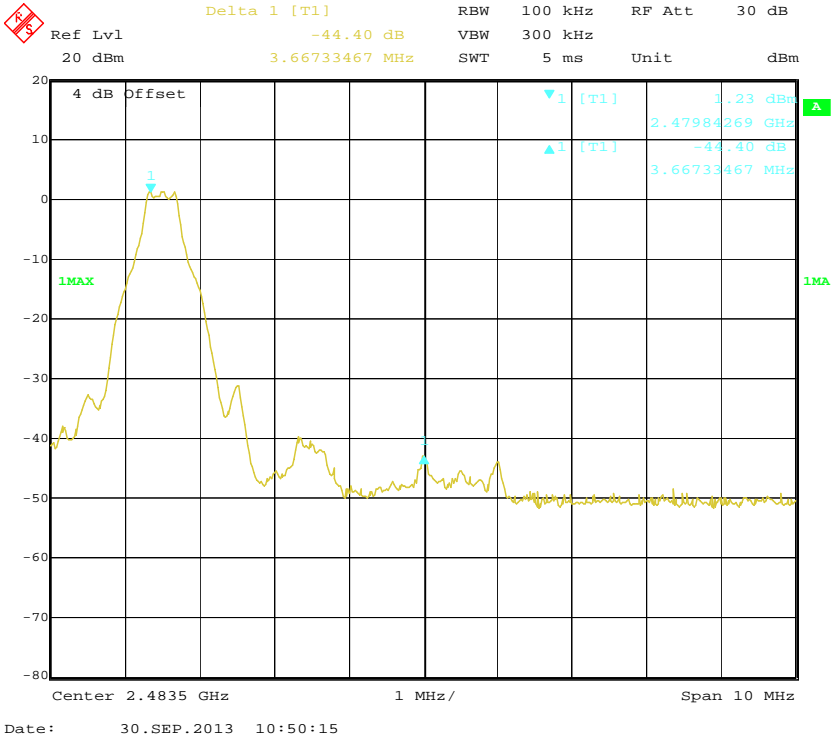
Test Mode: Transmitting

Mode	Frequency Band	Delta Peak to Band Emission (dBc)	Limit (dBc)
BDR (GFSK)	Left-band	39.66	>20
	Right-band	44.40	>20

Please refer to follow plots:

BDR (GFSK): Band Edge-Left Side

BDR (GFSK): Band Edge-Right Side



***** END OF REPORT *****